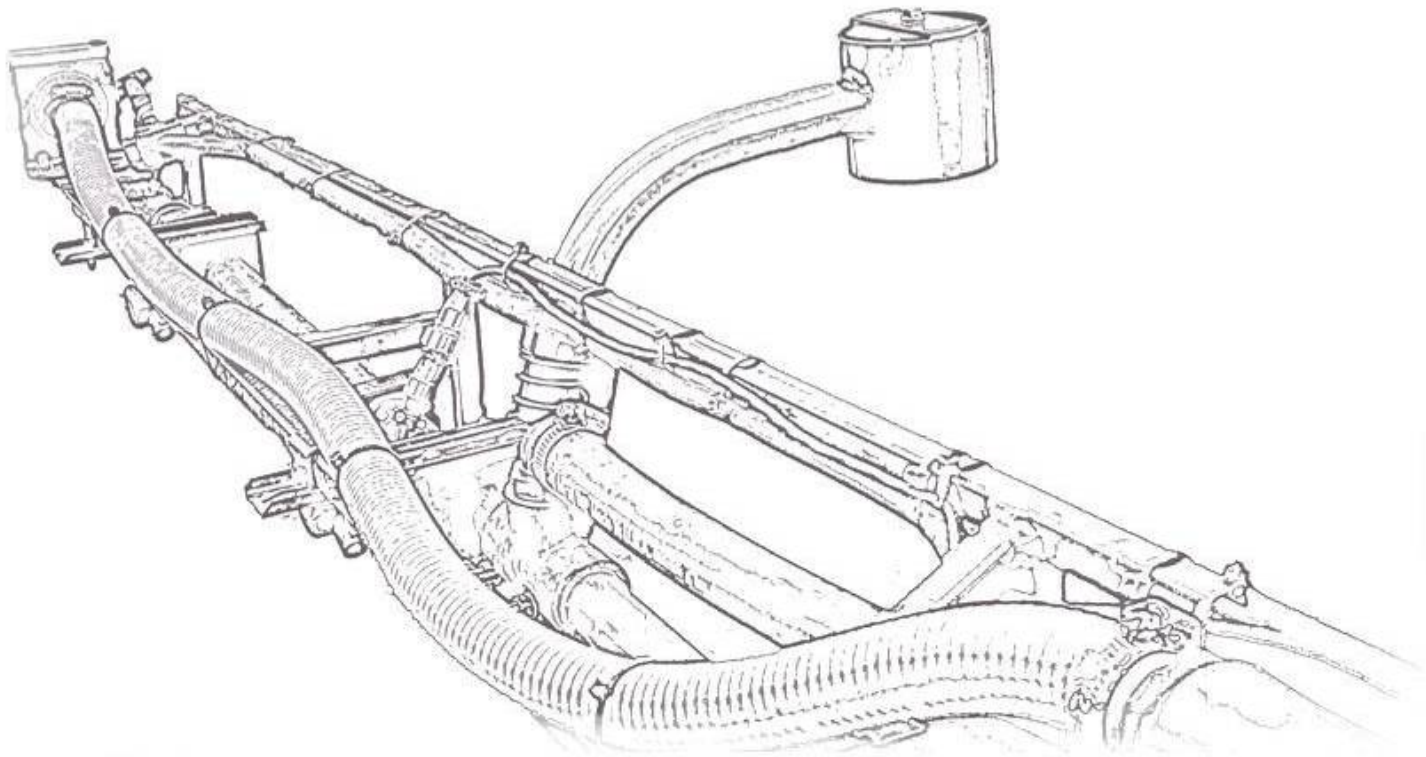
NORAC

UC4+™ ROLL CONTROL Patented

Spray Height Control System



HARDI AutoSlant (DAH or DAH 09) Installation Manual

Improving the competitiveness of Industry and Agriculture through Precision Measurement

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Reorder P/N: UC4+BC+HD5-INST Rev D (HARDI AutoSlant)

NOTICE

NORAC Systems International Inc. reserves the right to improve products and their specifications without notice and without the requirement to update products sold previously. Every effort has been made to ensure the accuracy of the information contained in this manual. The technical information in this manual was reviewed at the time of approval for publication.

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1 INTRODUCTION

Congratulations on your purchase of the NORAC UC4+ Spray Height Control System. This system is manufactured with top quality components and is engineered using the latest technology to provide operating features and reliability unmatched for years to come.

When properly used the system can provide protection from sprayer boom damage, improve sprayer efficiency, and ensure chemicals are applied correctly.

Please take the time to read this manual completely before attempting to install the system. A thorough understanding of this manual will ensure that you receive the maximum benefit from the system.

YOUR INPUT CAN HELP MAKE US BETTER! If you find issues or have suggestions regarding the parts list or the installation procedure, please don't hesitate to contact us.

2 GENERAL SYSTEM DESCRIPTION

Figure 1 depicts the general system layout of the UC4+ Spray Height Control System.

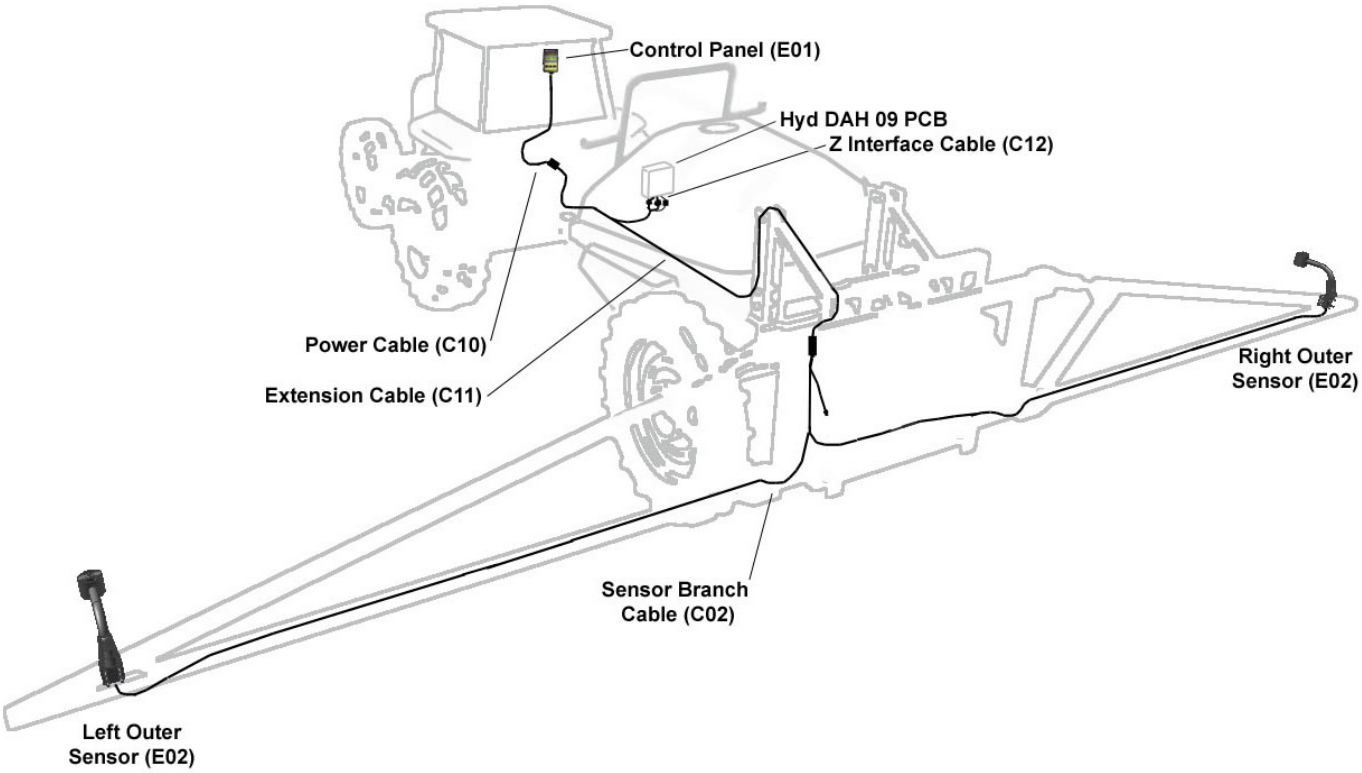


Figure 1: System Components And General Location (COMMANDER, NAVIGATOR, RANGER)

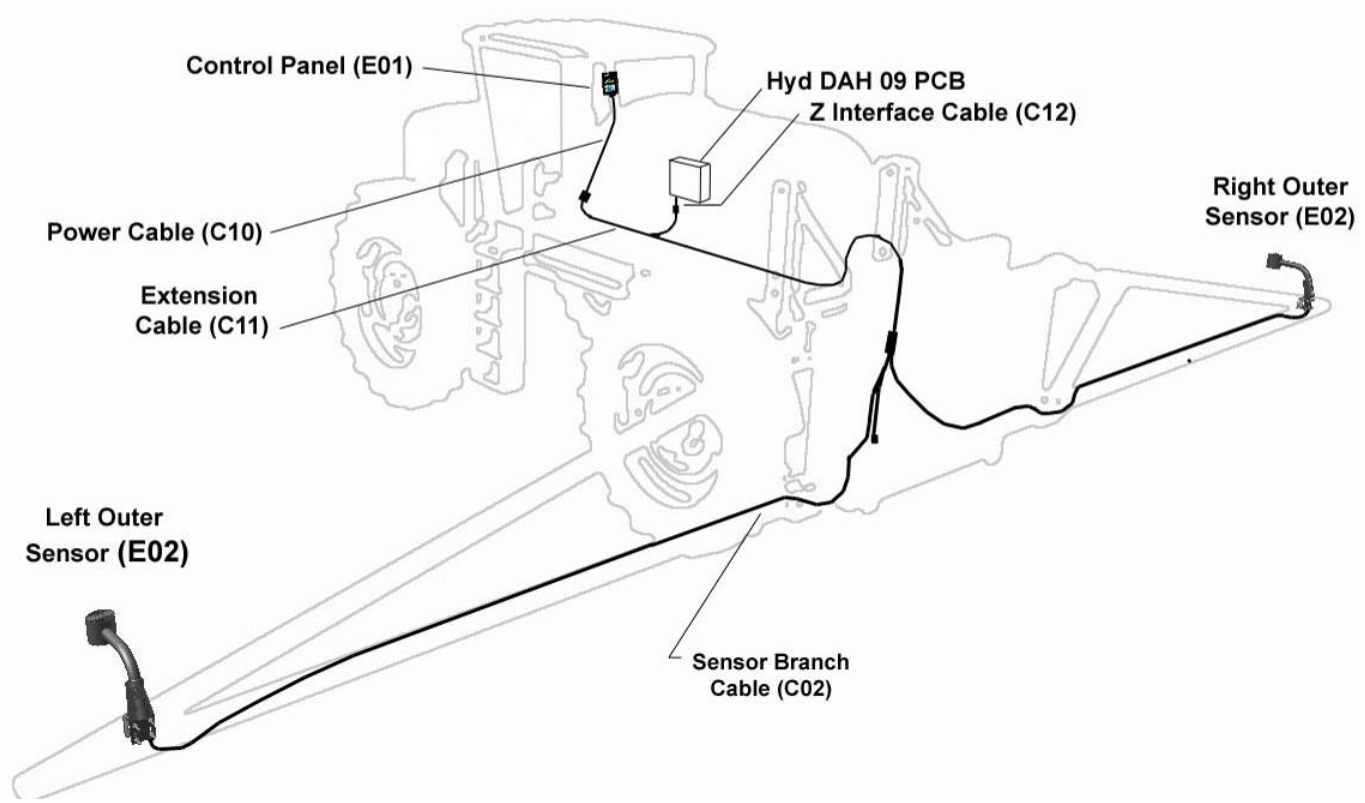


Figure 2: System Components And General Location (ALPHA)

NOTICE:

Every effort has been made to ensure the accuracy of the information contained in this manual. All parts supplied are selected specially to fit the sprayer to facilitate a complete installation. However, NORAC cannot guarantee all parts fit as intended due to the variations of the sprayer by the manufacturer. **Please read this manual in its entirety before attempting installation.**

ATTENTION:

When installing the UC4+ Spray Height Control system please be aware that at a point in the installation your sprayer booms will be inoperative until the installation is complete. **Any installation procedure requiring boom movement will need to be done first.** Once the hydraulics have been disconnected you must complete the electrical installation before the booms become operative.

3 PARTS LISTS

The parts that come with your UC4+ Spray Height Control System are listed in **Table 1.** The item number on the left side of this table references each part.

3.1 UC4+ PARTS LIST

Please ensure that all parts in your kit are present before proceeding with your installation.

Table 1: HD5 Spray Height Control System Parts

Item	Part Number	Name	Quantity
B06*	105728	RAM-233 RAIL MOUNT ADAPTER KIT FOR RAM-202 BASE	1
B13	44728	MOUNTING BRACKET COMPLETE UC4 BREAKAWAY EXTENDED	2
C02	44668	CABLE UC4 SENSOR BRANCH 1 AMP RECEPT 3 AMP PLUG BC	1
C10*	44658-52	CABLE UC4 POWER HARDI	1
C11	44658-50	CABLE UC4 INTERFACE EXTENSION HARDI	1
C12	44658-78	CABLE UC4 INTERFACE HARDI DAH09	1
C12A	44658-51	CABLE UC4 INTERFACE HARDI	1
C13	44782	CONN GP POWER PLUG 6 WAY	2
E01*	4461BC+HD	UC4 PLUS BOOM CONTROL PANEL HARDI	1
E02	44631	UC4 ULTRASOUND SENSOR	2
M01*	4476BC+MAN7	OPERATOR MANUAL UC4+ SPRAY HEIGHT CONTROL (FIXED BOOM)	1
M02	UC4+BC+HD5-INST	MANUAL INSTALLATION UC4+ HARDI AUTOSLANT	1
M03*	UC4+BC+HD5-INSTE	MANUAL INSTALLATION END-USER HARDI	1

3.2 HARDI PARTS LIST

The required HARDI Parts necessary for the UC4+ install are listed in Table 2.

Table 2: HARDI parts for HAZ, HPZ, LPZ

Item	Part Number	Name	Quantity
HARDI04	262126	LIQUIDTIGHT CONNECTOR	1
HARDI05	262107	LIQUIDTIGHT CONNECTOR NUT	1
HARDI06	284846	CABLE TIES	175

Item HARDI04 and HARDI05 are only required when using the 44658-51 (C12A) interface harness.

Table 3: HARDI parts for aluminum (round) booms

Item	Part Number	Name	Quantity
HARDI07	----------	ROUND TUBE CLAMPS FOR MOUNTING TO ALUMINUM BOOMS	4

Items numbers followed with an asterisks are to be delivered to the sprayer end-user. The UC4+ control panel mounting hardware is required for the installation to the tractor in accordance to the accompanied documentation.

Important

The use of dielectric grease is not recommended on any NORAC electrical connections.

Important

To ensure all stainless steel hardware does not gall or seize apply a light coating of the supplied Permatex Anti-seize grease to all threaded parts upon installation. Permatex Anti-seize lubricant is preferred, but other similar anti-seize products may be used.

The parts that come with your UC4+ System are shown below in their general installation configuration.

⚠ Cables C12A and C13 may be used in place of Cable C12 in some installations. See **Section 4.4** for details.

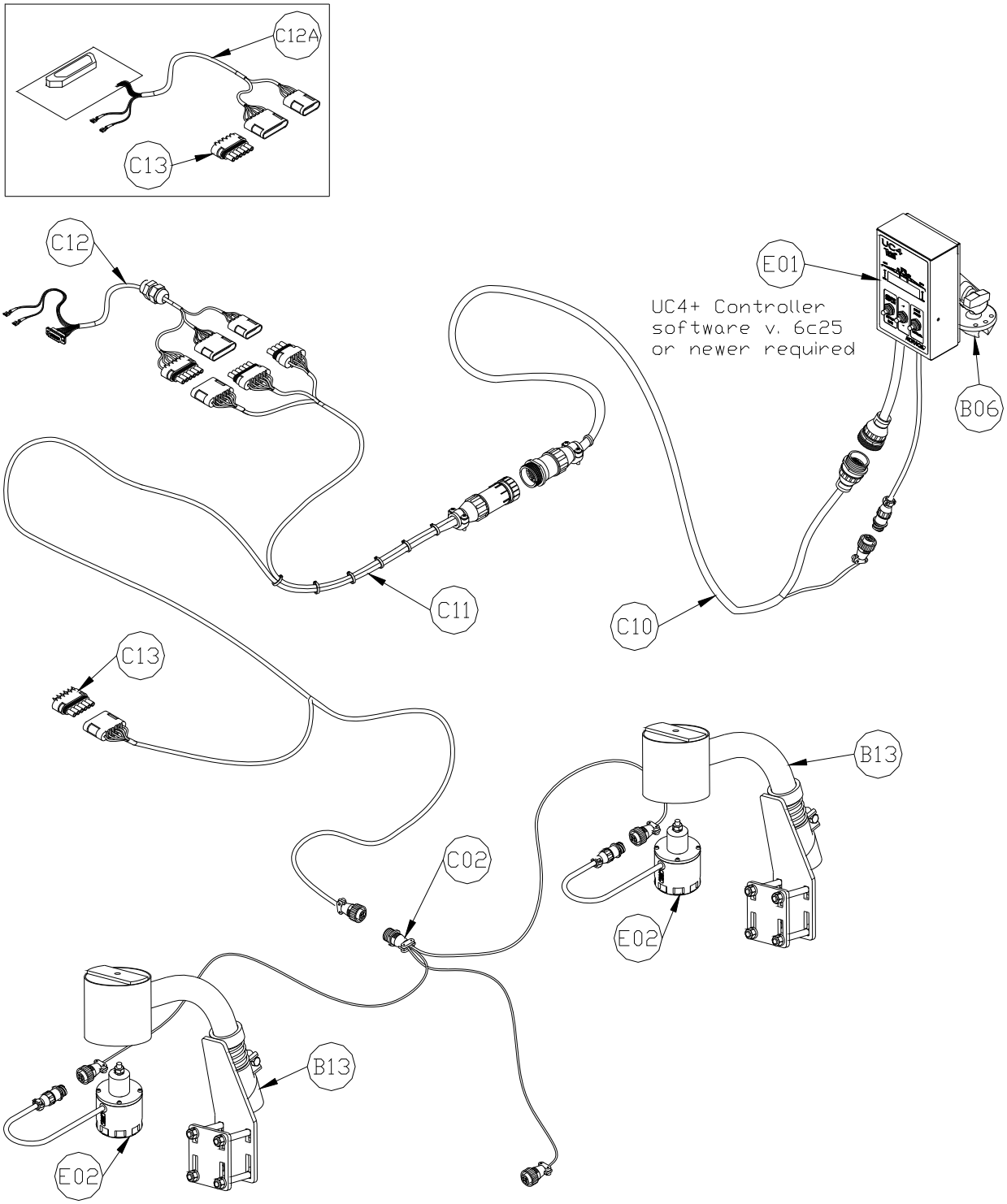


Figure 3: UC4+ Spray Height Control Components

4 INSTALLATION PROCEDURE

4.1 FUNCTIONALITY CHECK

Before beginning the install, ensure all hydraulic boom functions are operating properly on the sprayer.

- All Fold Functions
- Main Lift Function
- Wing Tilt Functions
- Slant Function

4.2 EXISTING SYSTEM CHECK

- Ensure the boom guide-rods are set to the "tapered" position (if applicable)
- Inspect sprayer suspension for functionality (excessive wear on slide pads, for example)
- Set boom suspension to be critically damped (**Figure 4**). Adjust the boom damper accordingly.
  - A) Unlock the pendulum, and push boom tip down approximately 75 cm (30 inches).
  - B) Hold the boom steady for a moment, and release.
  - C) Ensure the boom returns to its relaxed state as quickly as possible, with little to no overshoot.

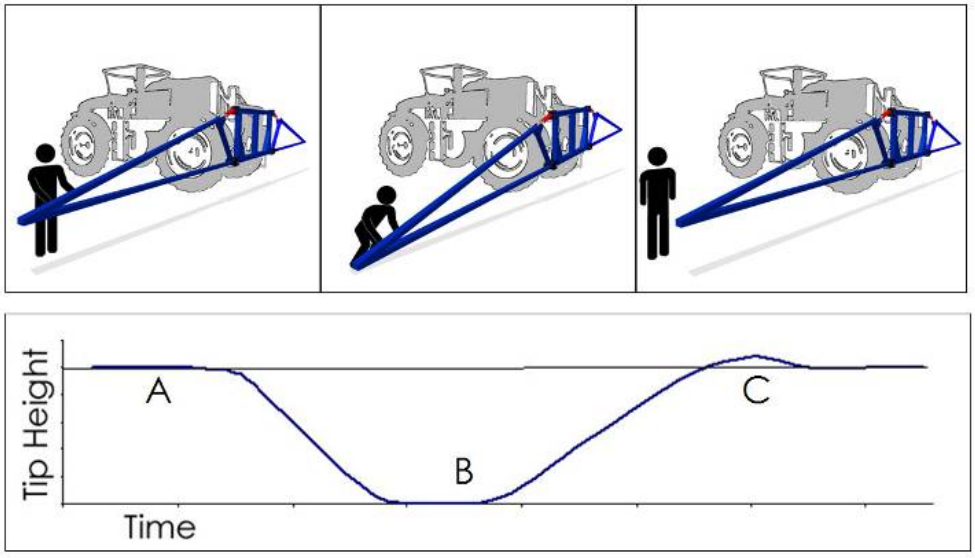


Figure 4: Boom Push Test- Critically Damped

4.3 WING SENSOR INSTALLATION

1. Assemble the Breakaway Sensor Mounting Brackets (**B11**) as show in **Figure 5**.

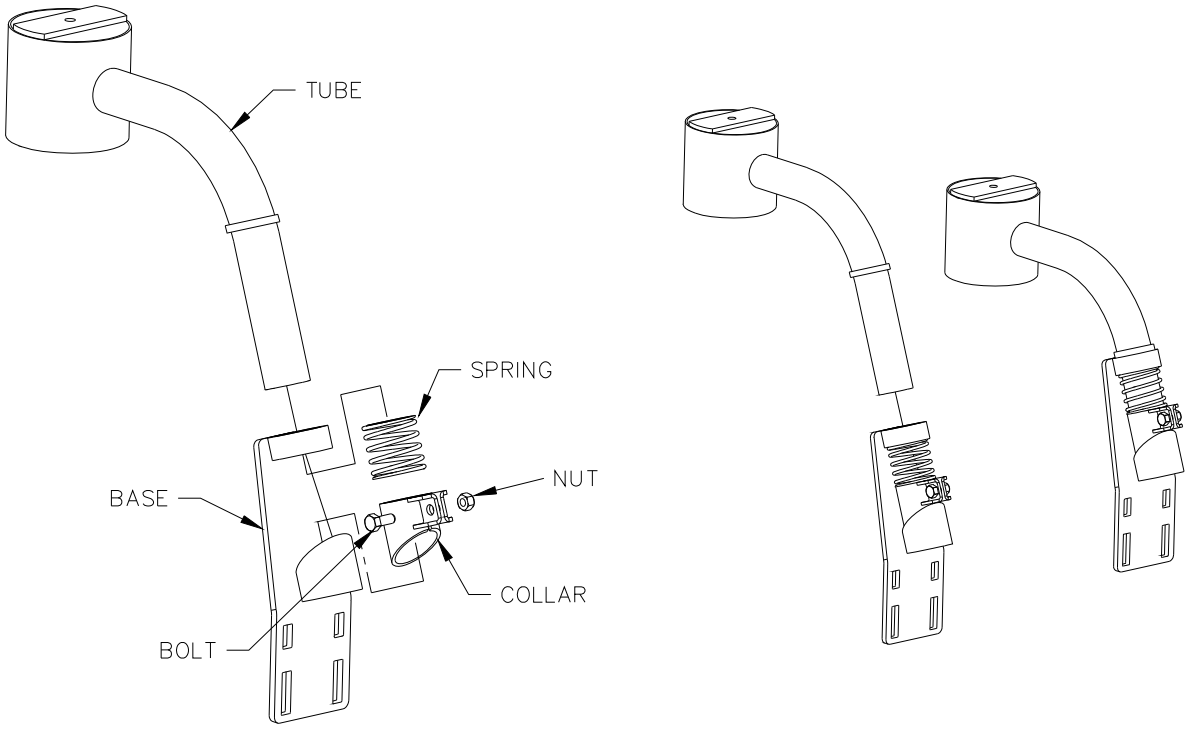


Figure 5: Breakaway Sensor Assembly

To assemble the breakaway sensor bracket:

a) Assemble the bolt and nut into the collar
b) Grease the bottom edge of the collar and the angled tube of the base
c) Place the collar onto the angled tube of the mounting base
d) Install the spring between the collar and the upper ring of the base
e) Insert tube through assembly and tighten the collar

2. Mount the sensor bracket onto the boom. Refer to section 4.3.2 for specific details on mounting to HARDI booms. The sensor brackets should be oriented forward (ahead) of the boom.

⚠ **If possible, mount the sensor brackets while the booms are in their folded position to ensure that they will not interfere with anything when the boom is folded for transport.**

3. The sensor mounting brackets can be installed with the mounting base in front of (**Figure 6**) or behind (**Figure 8**) the mounting tube.

⚠ **When installing the UC4+ sensors (E02), start with the smallest serial number on the left hand side proceeding to the largest serial number on the right hand side (Figure 10).**

4. Sensor cables should run through the mounting bracket tube and then behind the member the bracket is mounted onto. Cable-tie the connector in place. The cable must not be allowed to hang below the boom (**Figure 6**).

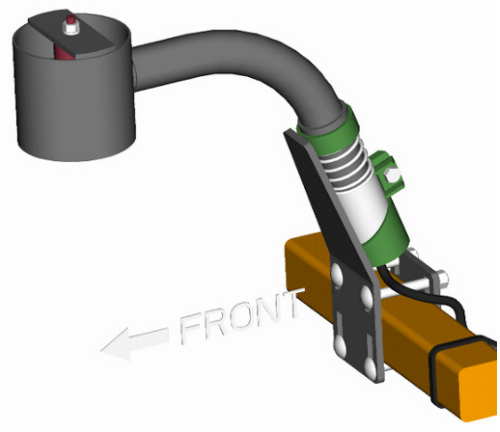


Figure 6: Sensor Cable Routing

⚠ **Avoid mounting sensors in locations where they may read from parts of the boom as shown in Figure 7.**

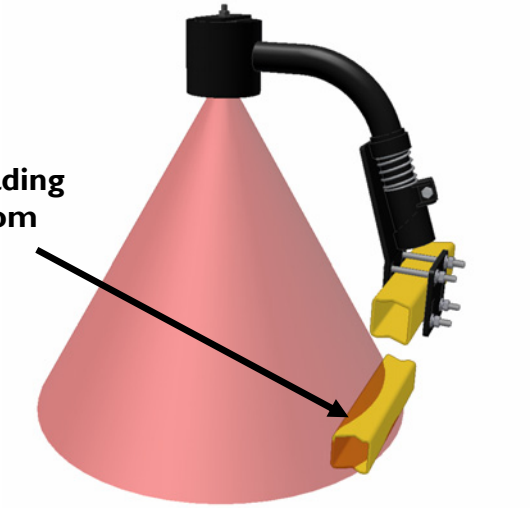


Figure 7: Poor Sensor Mounting

4.3.1 General Mounting Rules for UC4+ Ultrasonic Wing Sensors:

a) In its lowest position, the sensor mouth must be 9 inches or more from the ground.

b) The bottom of the sensor must be at least 9 inches in front of the spray nozzles.

c) The bottom of the sensor must be at least 9 inches above the spray nozzles.

d) Ensure that there are no obstructions within a 12-inch diameter circle projected directly below the center of the sensor.

e) The sensor should be approximately vertical at normal operating heights.

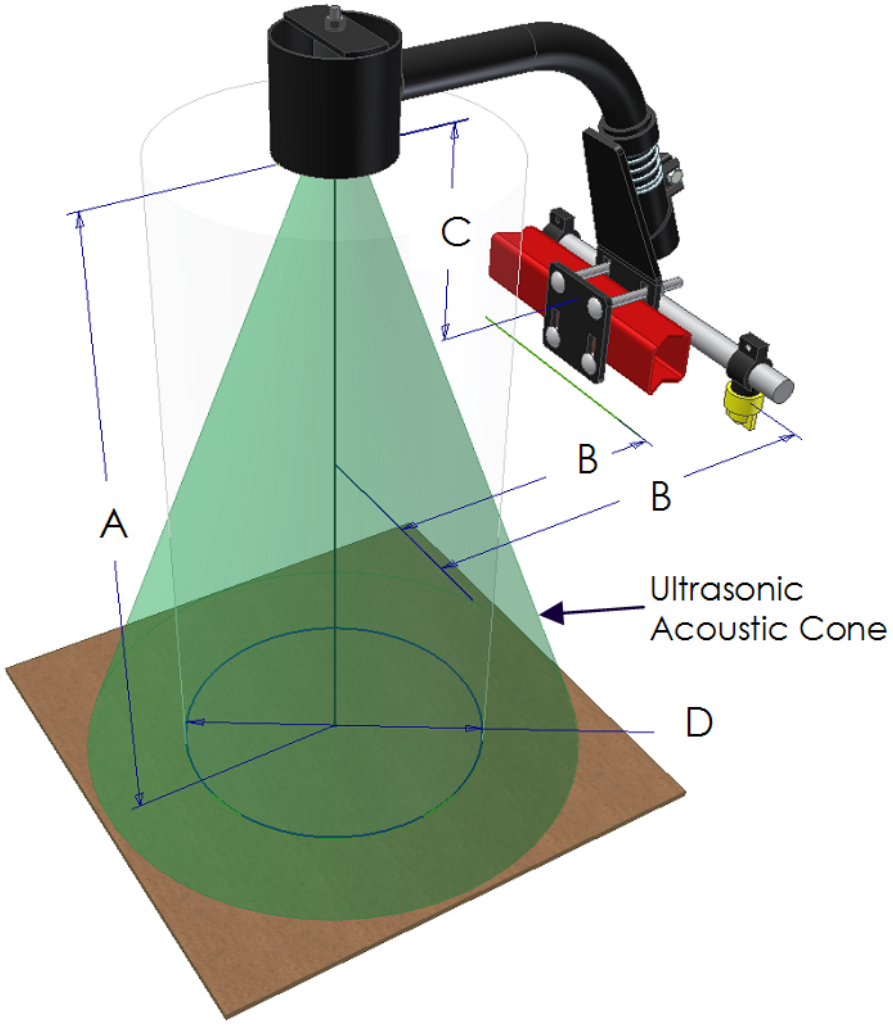


Figure 8: Sensor Mounting Guidelines

⚠ **Arrange the ultrasonic serial numbers from lowest to highest, left to right. Apply a light coating of the supplied Permatex Anti-seize grease to all threaded parts upon installation.**

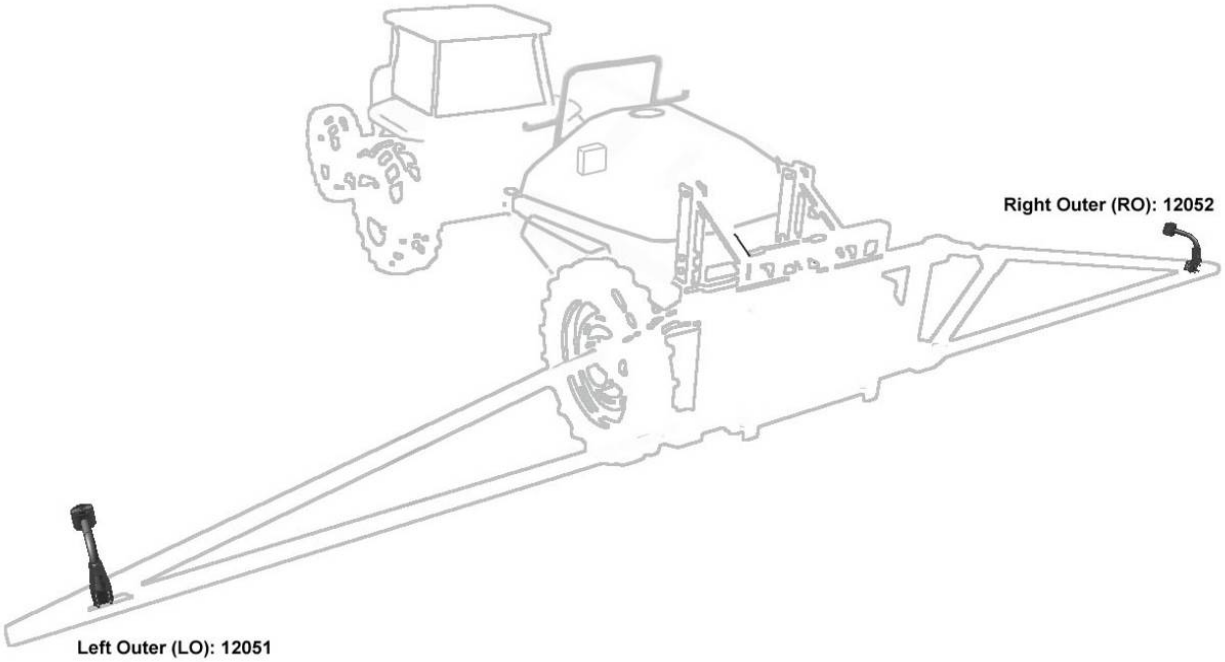


Figure 9: Sensor Serial Number Installation Location (Pull-Type)

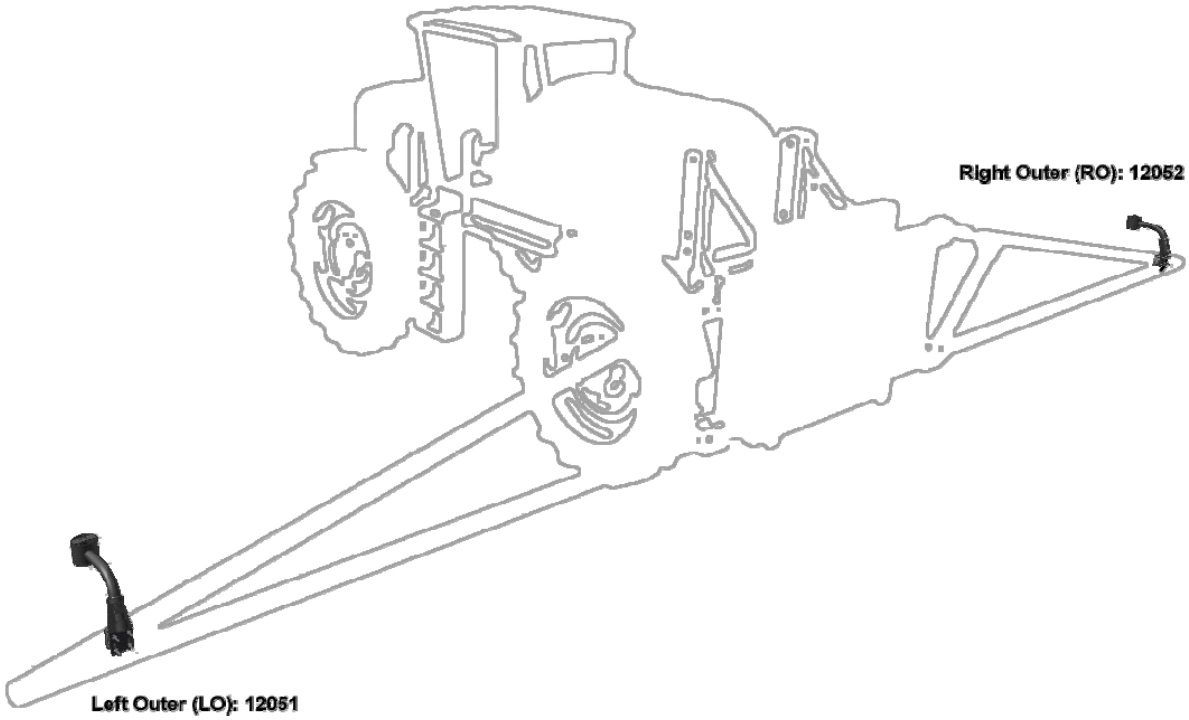


Figure 10: Sensor Serial Number Installation Location (Self-Propelled)

4.3.2 HPZ (24-36m) /HAZ (18-30m)

Below is the suggested mounting location for the UC4 brackets on the HPZ (24-36m) or HAZ (18-30m) booms. Mounting location is just inside of the boom break-away section (A).

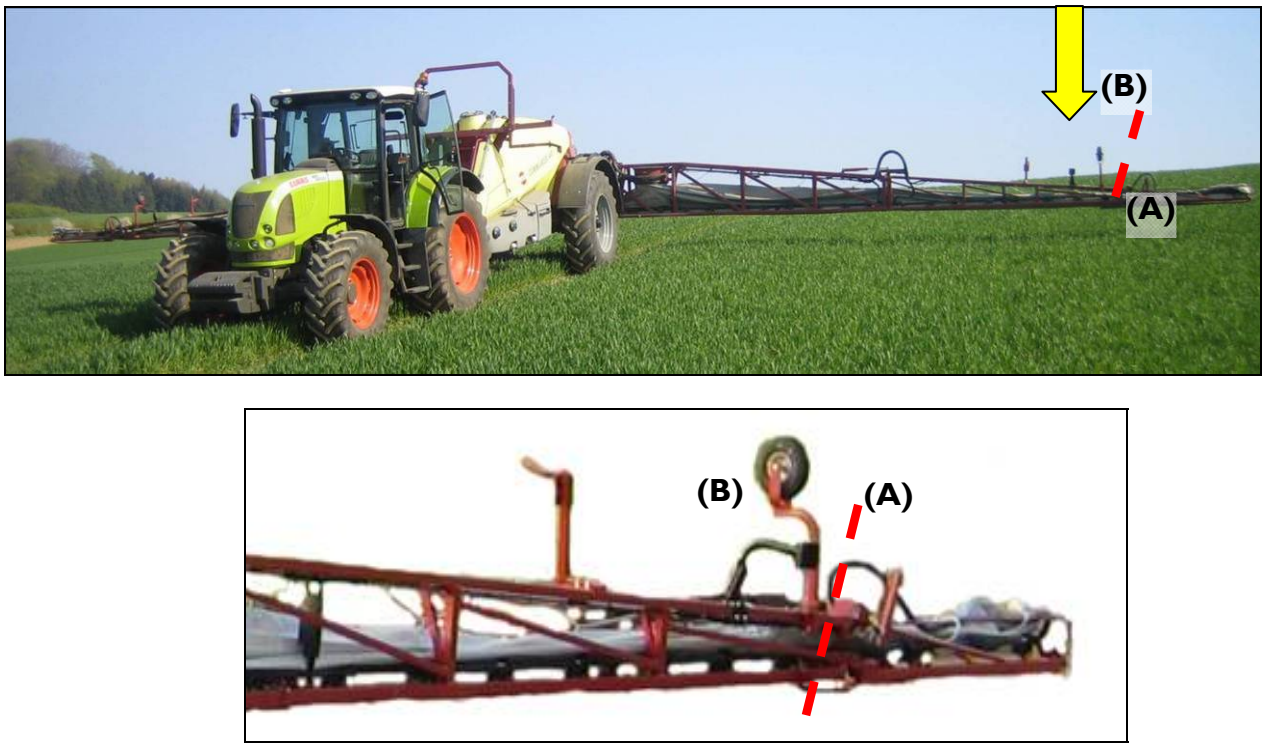


Figure 11: Suggested Bracket Mounting Location (viewed from front) on 24m HAZ

⚠ **IMPORTANT:**

Avoid mounting the bracket too close to the touch-down wheel (B).

4.3.3 HAZ (32-36m)

Below is the suggested mounting location for the UC4 brackets on the HAZ 32-36m booms. Mounting location is just inside of the boom break-away section (A).

Figure 12: Suggested Bracket Mounting Location (viewed from front) on 36m HAZ

4.3.4 LPZ

Below is the suggested mounting location for the UC4 brackets on the LPZ boom. Mounting location is just inside of the boom break-away section (A).

Figure 13: Suggested Bracket Mounting Location on LPZ Boom

4.3.5 Round Profile Aluminum Booms

Mount the sensor bracket using round tube clamps (item HARI07), near the spring for the tip breakaway. Ensure the bracket does not rotate downwards with vibration. Mounting location is just inside of the boom break-away section (A).

Figure 14: Suggested Bracket Mounting Location

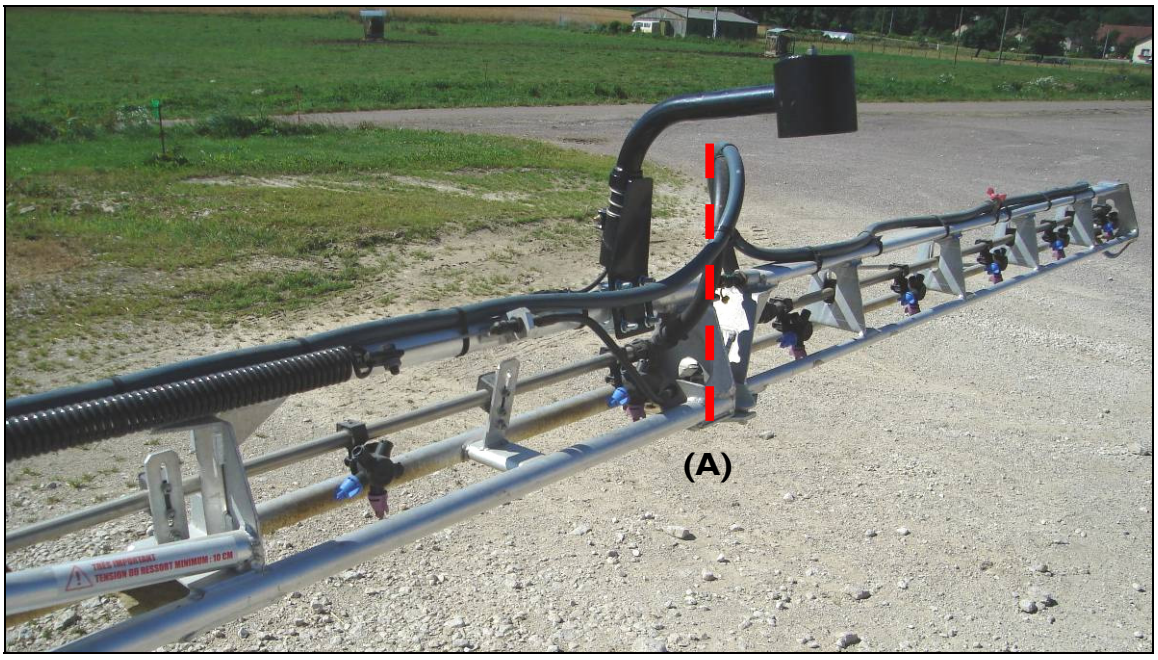


Figure 15: Another Acceptable Mounting Location

4.4 ELECTRICAL INSTALLATION

Ensure the UC4+ Control Panel us OFF for the remainder of the installation (Bottom of switch pressed IN). Use caution when handling the 12 V power line of the sprayer wiring.

⚠ **Depending on the electronics used on the sprayer, either the Norac part 44658-51 or 44658-78 will be required for this installation. For installations using 44658-51, proceed to section 4.4.1. For installations using the 44658-78 proceed to section 4.4.2.**

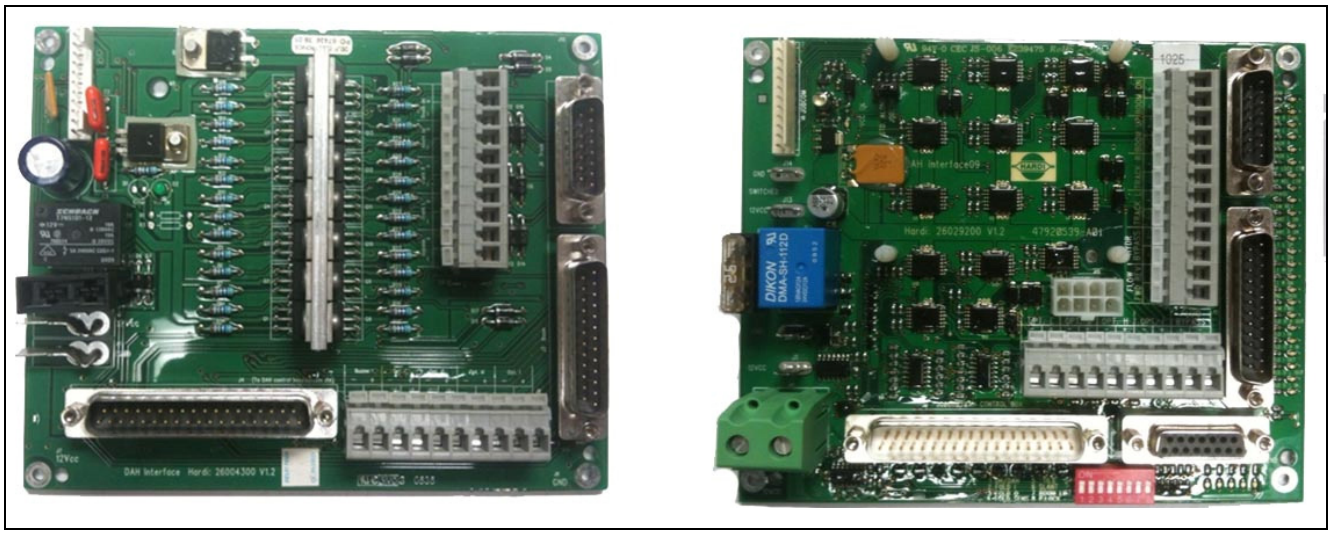


Figure 16: HARDI DAH on left (use 44658-51) vs. DAH09 on right (use 44658-78)

4.4.1 General Installation Instructions using 44658-51

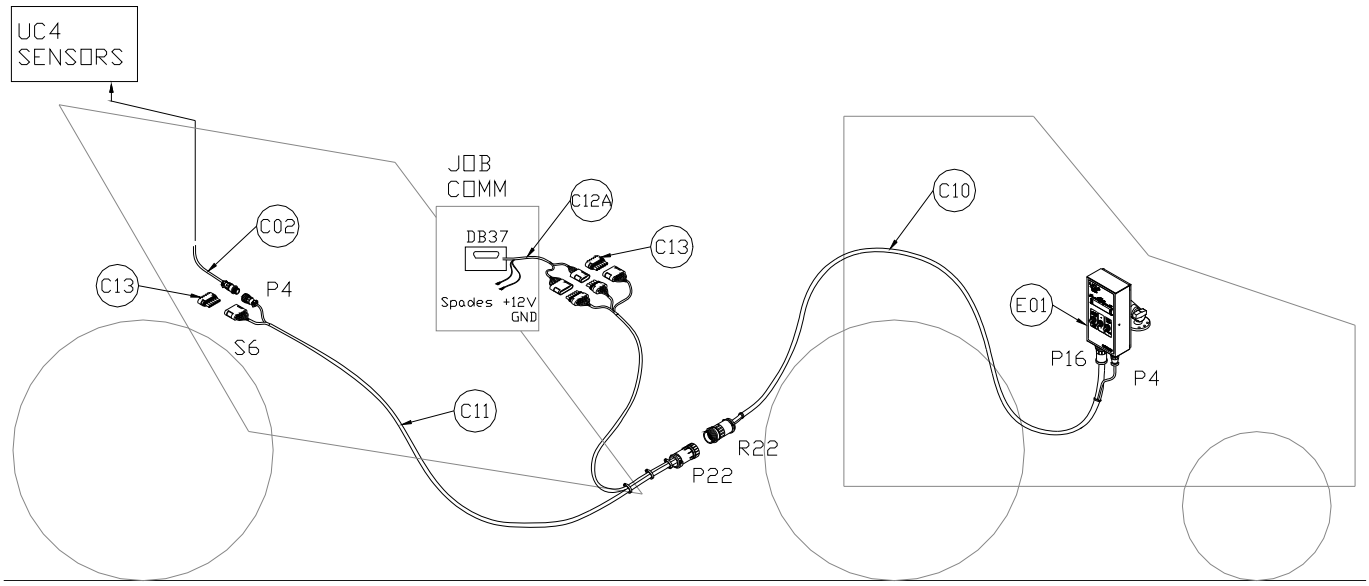


Figure 17: Cable Routing Overview (using 44658-51)

1. Connect the UC4 power cable **(C10**) to the UC4+ Control Panel in the cab. Ensure that both plugs (**P16** and **P4**) are connected to the panel (**Figure 17**)**.**

2. Route the 22-pin AMP receptacle (**R22**) of **C10** to the exterior of the cab.

3. Connect the 22-pin AMP plug (P22) of the extension cable (C11) to R22 of C10 (**Figure 17**). Connect at the hitch. This connection will provide your hitch disconnect.

4. Run cable C11 from the hitch to the rear of the sprayer.

5. Install the sensor branch cable (**C02**) along the boom between the ultrasonic sensors. Be sure to route the cable through the boom to avoid damage to the cable during field operation or boom folding. Connect cable C02 to cable C11. One 4-pin round connector on C11 will remain unused.

6. Route the 6-pin and 4-pin tower connectors (**T6** and **T4**) of **C11** in the vicinity of the Job-com box.

⚠ **Ensure power to the Job-com is turned off.**

7. If the sprayer uses one forward/reverse valve and a number of cartridge valves (HARDI DH) turn on the DIP switch of **C12A** (**Figure 18**). Otherwise leave the switches OFF (HARDI DAH). There is denotation on the switch. Turn BOTH switches either ON or OFF.

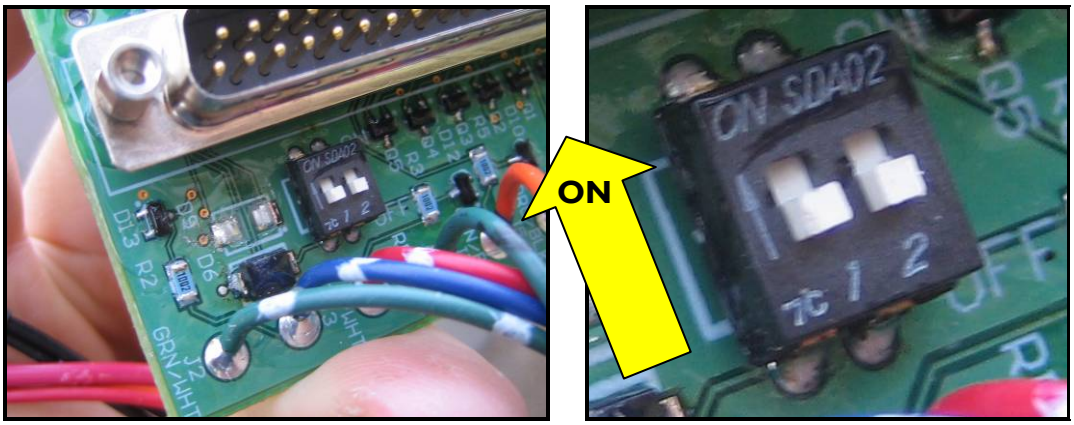


Figure 18: 44658-51 Interface Board Configuration Switch

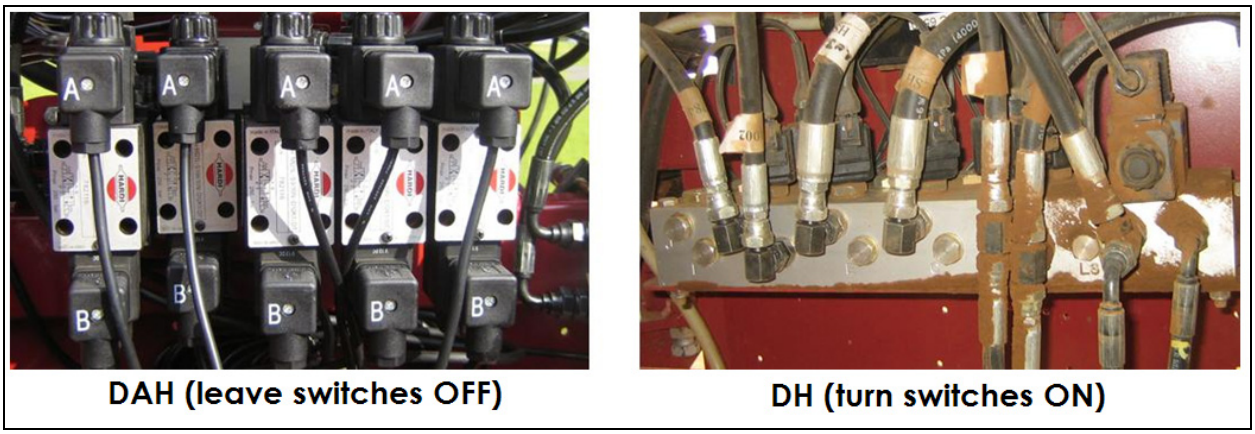


Figure 19:DAH valve (left) and DH valve (right)

⚠ **If the switch is not turned on for DH hydraulics, the boom slant will not function.**

8. Connect the NORAC C12A between the J4 connection on the HARDI PCB and the blue wiring harness.

   a) Remove the blue harness from J4 (37-pin DB male socket) on the PCB inside of the Job-com.

   b) Insert the 37-pin DB female socket on the PCB of the interface cable (**C12A**) into **J4**. Screw it down to **J4.** This requires removing the small nuts on the DB-37 connector.

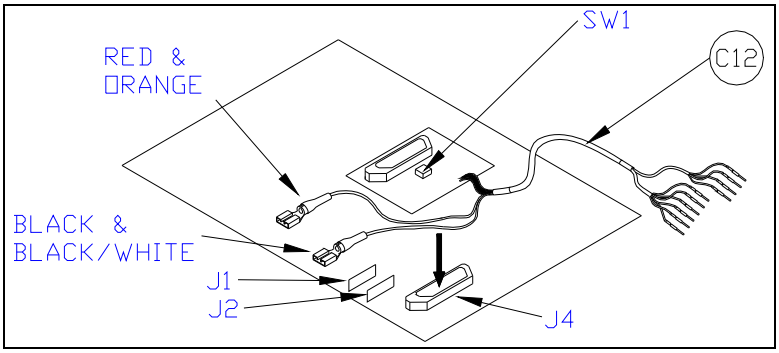


Figure 20: J1, J2 and J4 on HARDI DAH Board

c) Insert the blue-wire harness into the 37-pin DB male socket on the other side of the PCB of **C12A**. Screw it down to the socket.

⚠ **Do not connect spade connectors to J1&J2 until step 9.**

9. Run the free end of **C12A** through an unused hole of the electronics enclosure. This requires installing the Liquidtight connector (Pt. HARDI04, HARDI05) BEFORE proceeding to step 8.

10. Put pins of C12A to the 6-pin and 4-pin Weatherpack connectors (S6 and S4) which are included in this kit according to the table below. One connector on harness C11 may by unused. Seal the unused connector with a 6-pin Weatherpack plug (part #).

Connector	Denotation	Wire Color
S6	A	BLUE/WHITE
	B	GREEN/WHITE
	C	BLUE
	D	ORANGE/BLCK
	E*	RED/WHITE
	F*	GREEN/BLACK
S4	A	RED
	B	ORANGE
	C	BLACK
	D	BLACK/WHITE

⚠ **The wire colors and the pin-out are the same as ones on the mating connectors (T6 and T4) of the extension cable (C11).**

4.4.2 General Installation Instructions using 44658-78

Ensure sprayer power is turned off.

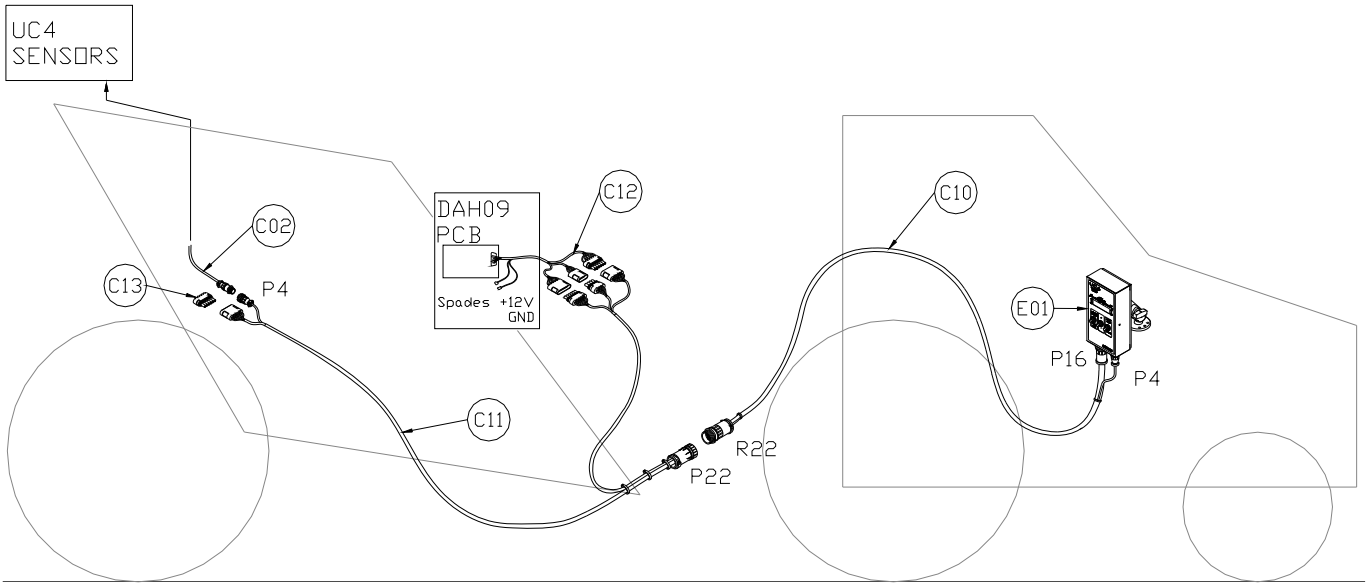


Figure 21: Cable Routing Overview (using 44658-78)

1. Connect the UC4 power cable (**C10**) to the UC4+ Control Panel in the cab. Ensure that both plugs (**P16** and **P4**) are connected to the panel.

2. Route the 22-pin AMP receptacle (**R22**) of C10 to the exterior of the cab.

3. Connect the 22-pin AMP plug (**P22**) of the extension cable (**C11**) to R22 of C10. Position this connection near the hitch. This will provide the hitch disconnect.

4. Run cable C11 from the hitch to the rear of the sprayer.

5. Install the sensor branch cable (**C02**) along the boom between the ultrasonic sensors. Be sure to route the cable through the boom to avoid damage to the cable during field operation or boom folding. Connect the ultrasonic sensors to this cable, and connect C02 to cable C11. One 4-pin round connector on the sensor branch cable will remain unused.

6. Plug the unused 6-pin Weatherpack shroud on cable C11with the 6-pin tower plug C13.

7. Connect T4, T6 and S6 of cable C11 to S4, S6 and T6 of cable C12 respectively.

8. Run the DB15 connector and the wires with the spade connectors of C12 to the DAH 09 PCB by passing it through a hole in the enclosure. Seal the hole using the weather-proof strain relief fitting.

9. Connect the DB15 connector of cable C12 to the DAH09 DB15 connector.

10. Connect the red wire with spade connector on C12 to the Switched 12VCC on the DAH09 board (**Figure 22**).

11. Connect the black wire with spade connector on C12 to the GND on the DAH09 board (**Figure 22**).

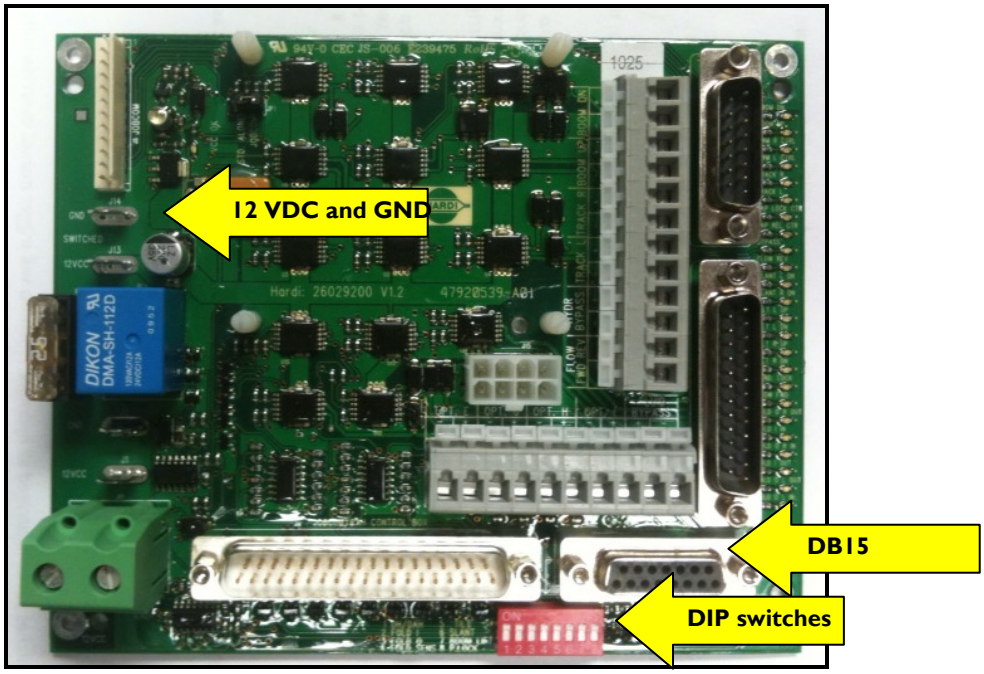


Figure 22: DAH09 PCB for Autoslant

12. Configure the system for Autoslant by setting the DIP switches on DAH09 board:

    a) Set DIP switches 2,3,4,5,6, and 8 to ON. Set DIP switch 7 to OFF (**Figure 23**).

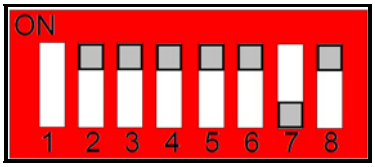


Figure 23: Suggested Default Setting for DIP Switches 2-8 for AUTOSLANT

    b) If the sprayer uses a DAH valve block set DIP switch 1 to OFF. If the sprayer uses a DH valve block set DIP switch 1 to ON. See **Figure 24**.

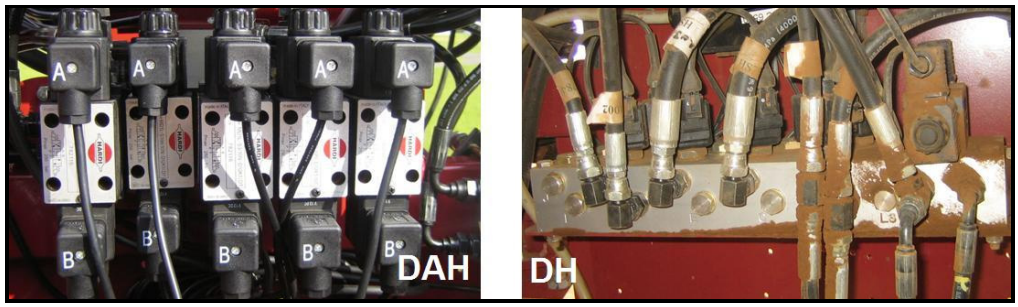


Figure 24: HARDI DAH (DIP 1 OFF) vs. DH Block (DIP 1 ON)

13. Close the electronics enclosure. Gather up excess cable (C11 & C02) and neatly cable-tie to the machine.

Notice:

Additional instructions are available in the UC4+BC+HD4-INSTE (End-user manual) for configuring spray ON/OFF signal sensing and headland modes. With these features the Autoslant system will function together with the spray signal, switching boom height control on and off with the spray signal. This function can also be configured to raise the boom automatically for headland turning. Refer to the HD4 end-user manual for more information. These additional features described are only available when using the HARDI DAH09 PCB.

This is only applicable for systems using the DAH09 interface and with harness 44658-78.

Notice:

Some sprayers have been found to have the slant functions wired differently than others. To interface the UC4+ system to the sprayer it will be necessary to adjust the wiring on the 44658-78 interface PCB (item C12) or 44658-51 (C12A), depending on the type of install.

- If the left-hand tip lifts when you press the left button, and the right-hand button lifts the right hand tip (as shown in Figure 25), the wiring as described above is correct.

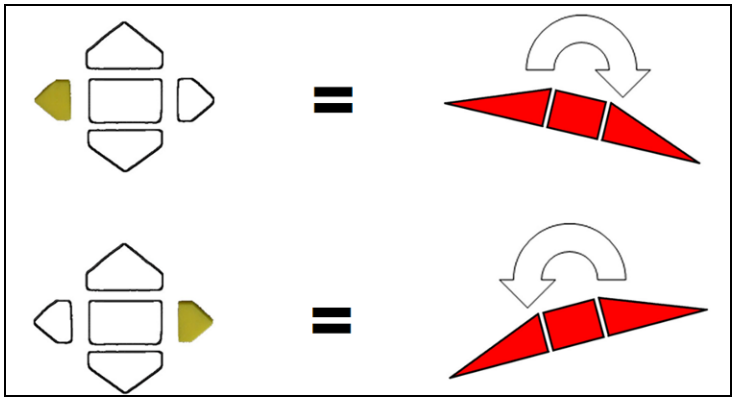


Figure 25: Default slant direction wiring

- However, if the boom does the opposite of what is described above, it is necessary to swap the **E** and **F** wires in the **S6** connector of cable C12 (or C12A).

5 COMPLETING THE FACTORY INSTALLATION

1. Test the functionality of the original manufacturer's boom controls. Power to the NORAC control panel does not need to on be for the sprayer controls to function. Unfold the booms and raise/lower each boom and main section. If one or more of these functions do not work, review the hydraulic and electrical portions of this manual to check for proper installation.

2. Confirm that the cabling/hoses are at agreeable lengths for the entire range of motion.

3. Prepare the spray boom for the software installation.

    - Unfold the booms and level to 90 cm (or 35 inch) nozzle height. Ensure the boom slant is in its centered position.

    - At this point ensure the UC4+ sensors are reading from an adequate and uniform target, such as gravel or dirt. Do not attempt to perform the installation over grass or crop.

    - If the installation is done over concrete, place carpet beneath the sensors to avoid sensor problems during the installation.

4. Switch on the UC4+ control panel and select the **HD5** sprayer type.

5. At this point two install options are available:

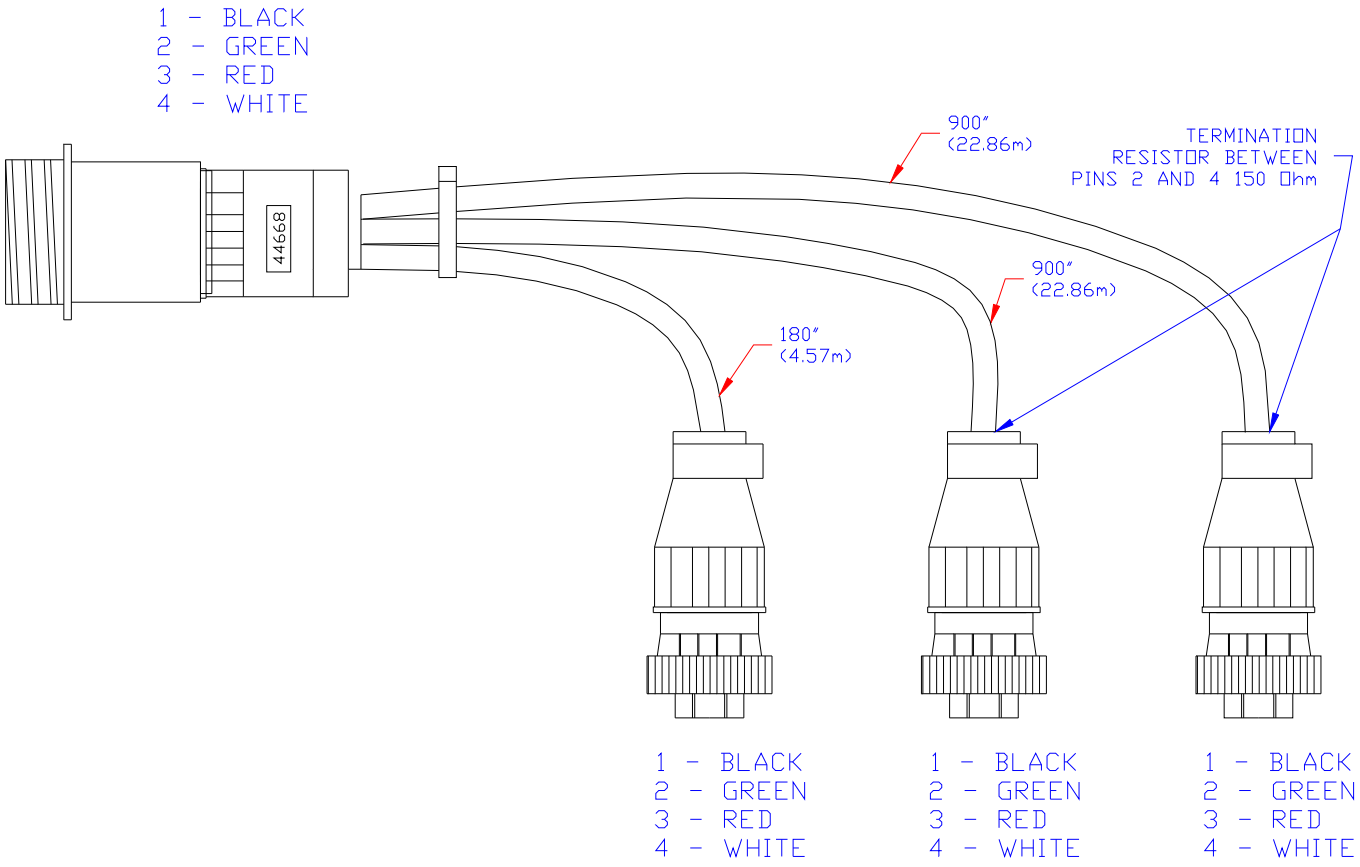
    a. Complete Install- this will setup the entire AutoSlant system, requiring fully range of boom moment. Hydraulics will be calibrated to the hydraulic power unit connected. To perform a complete install press "Yes" and follow the on screen instructions.

    b. Quick Install- this will require the boom to be unfolded at 90cm spray height but no hydraulic movement will occur (hydraulic calibration will occur at a later time by performing a "Retune" on the final hydraulic power unit. To perform a Quick Install, press and hold the "Yes" switch until "SENSOR" appears on the screen and release. Follow the on screen instructions.

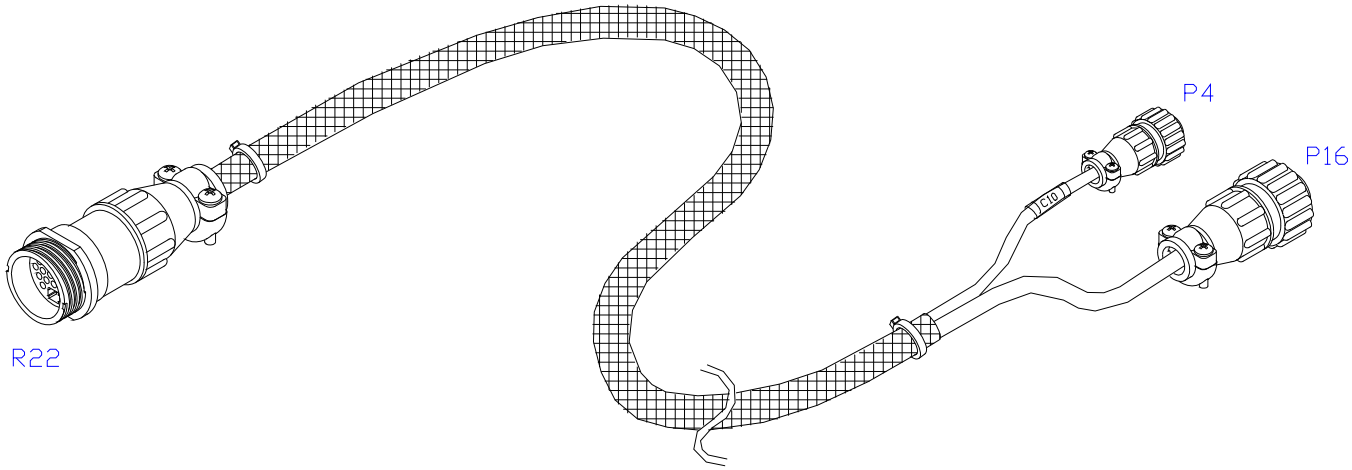
Refer to the UC4+ Operators Manual for more detail.

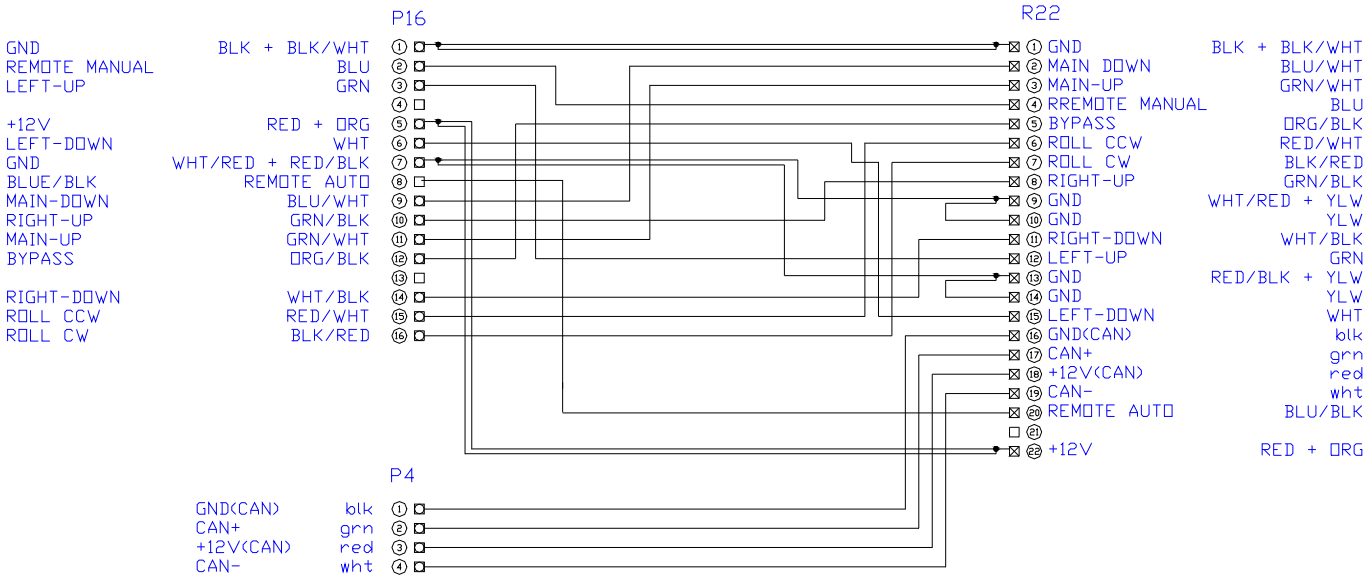
6 ELECTRICAL REFERENCE – CABLE DRAWINGS

6.1 ITEM C02: 44668 – CABLE SENSOR BRANCH

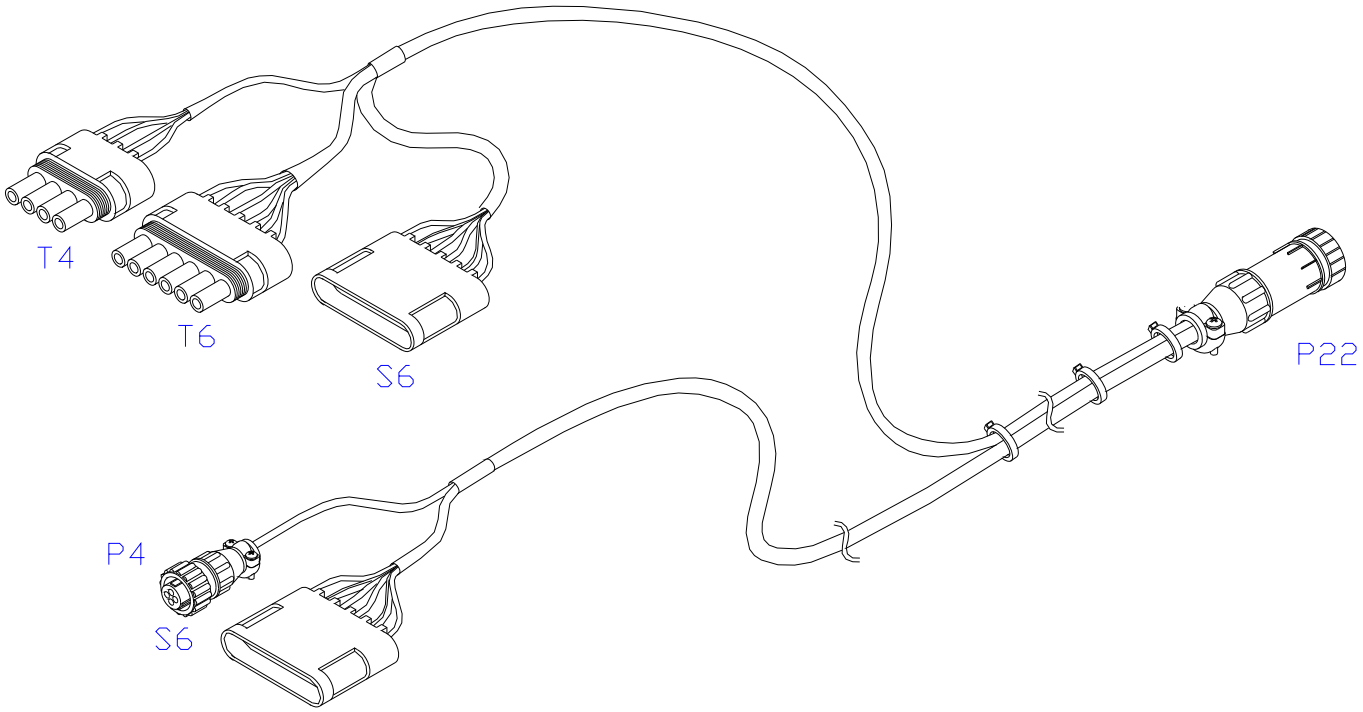


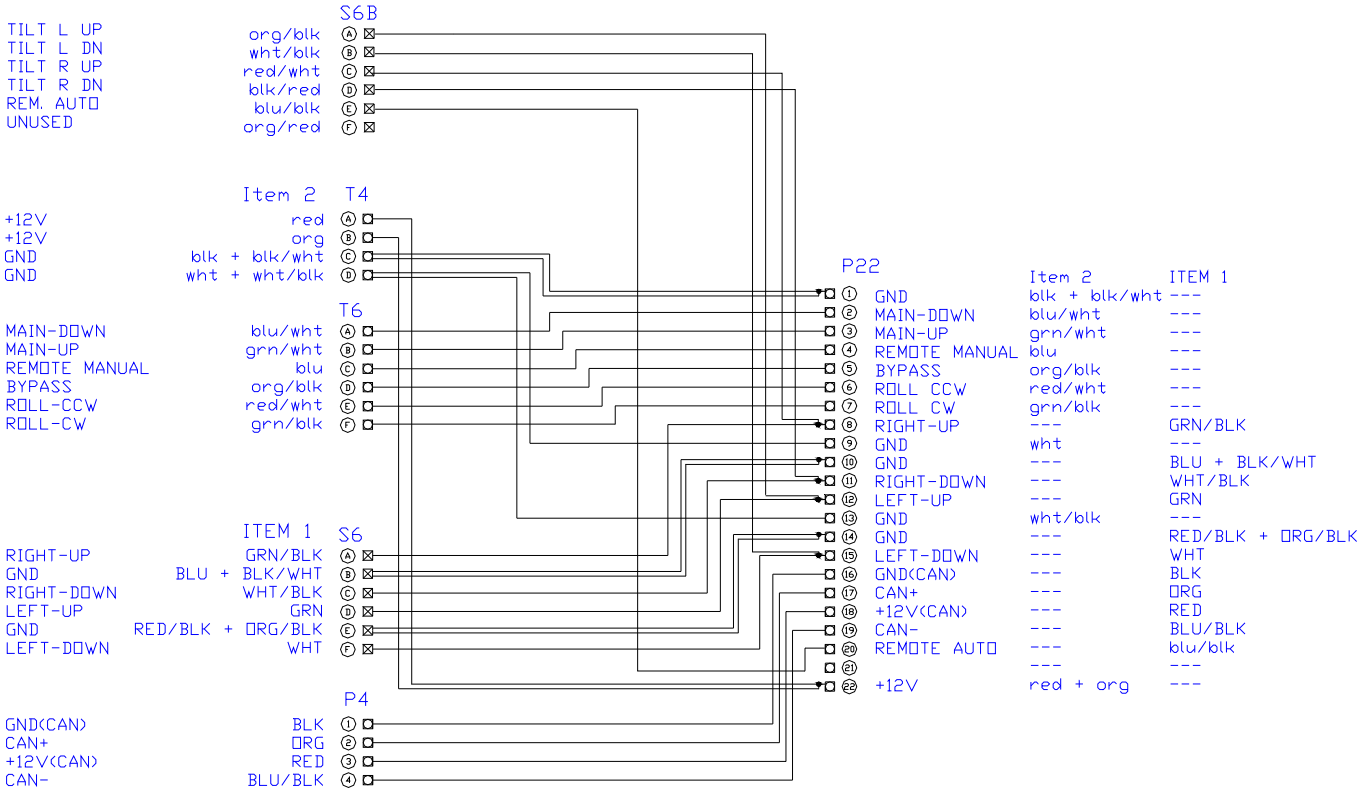
6.2 ITEM C10: 44658 -52 – CABLE UC4 POWER HARDI



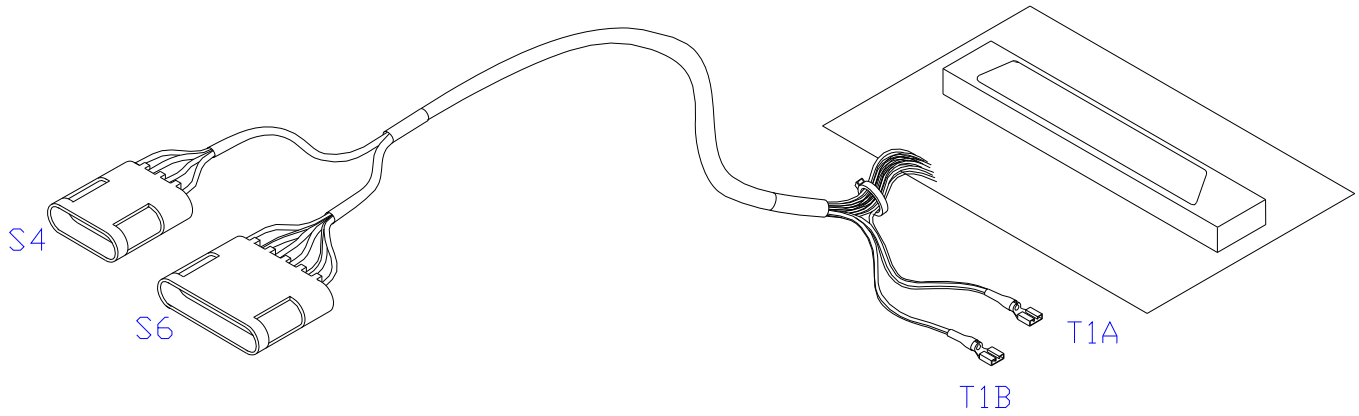


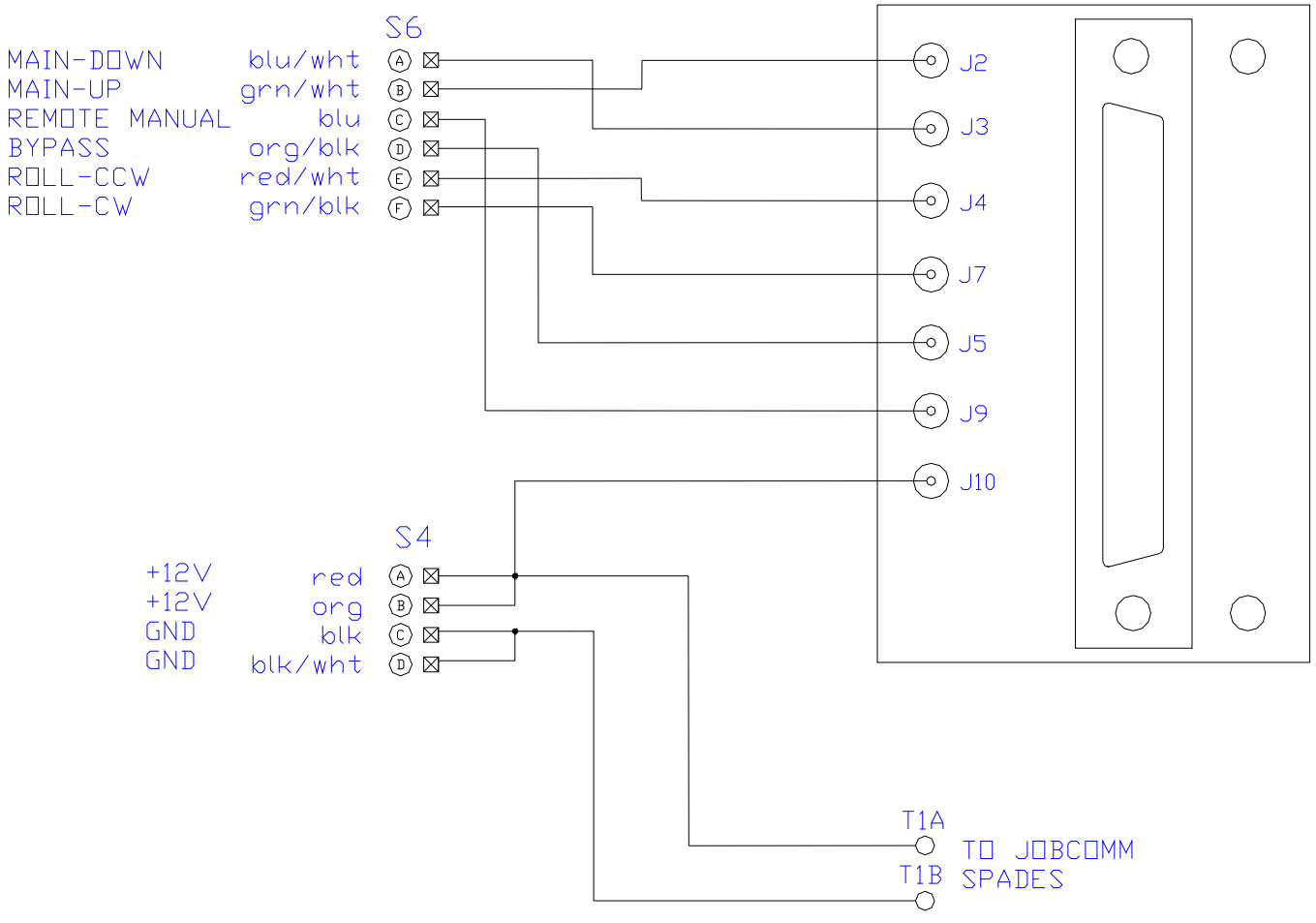
6.3 ITEM C11: 44658 -50 – CABLE UC4 INTERFACE EXTENSION HARDI



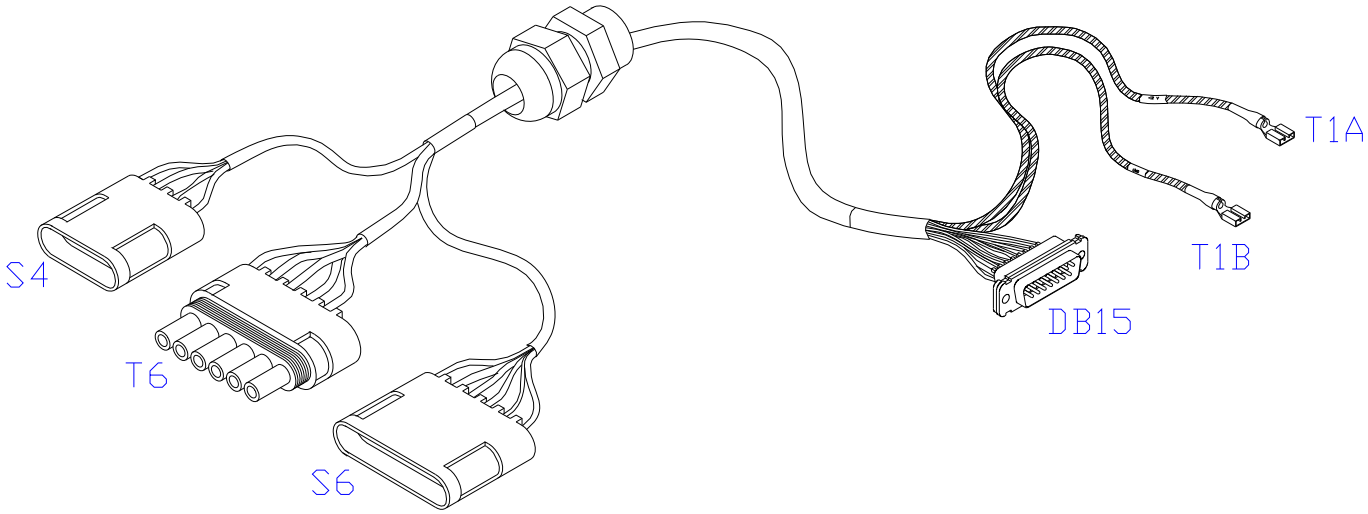


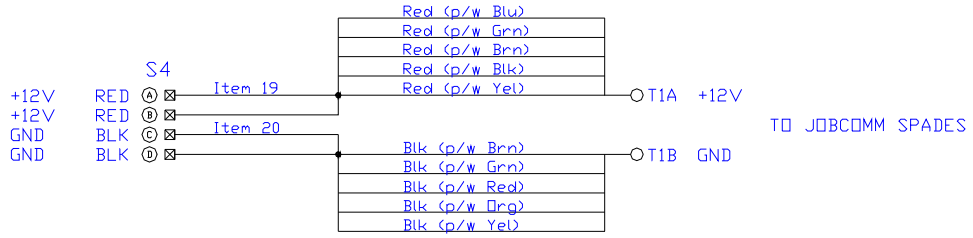
6.4 ITEM C12A: 44658-51 - CABLE UC4 INTERFACE HARDI DAH

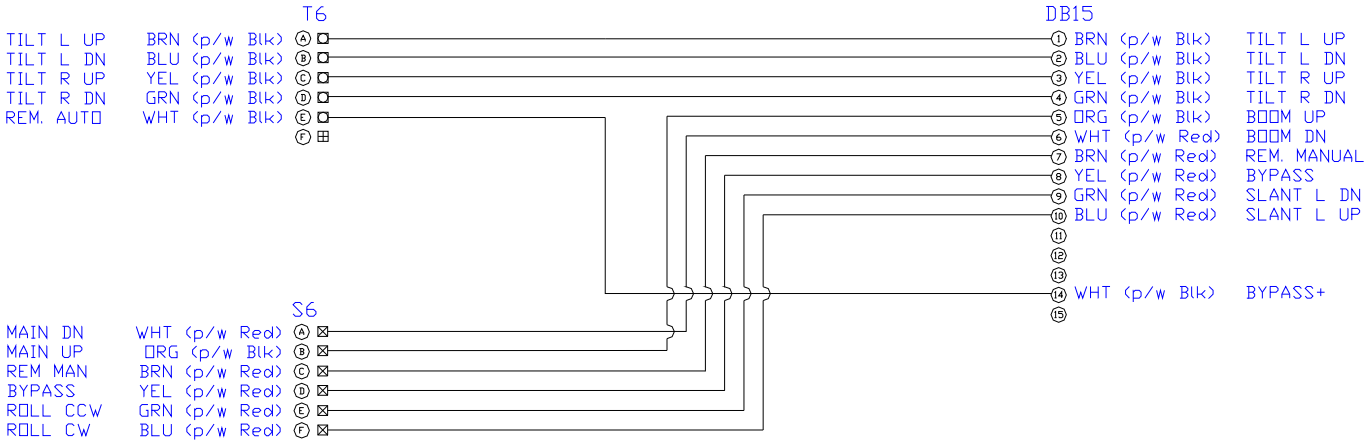




6.5 ITEM C12: 44658 -78 – CABLE UC4 INTERFACE HARDI DAH09






T6
TILT L UP BRN (p/w Blk) A
TILT L DN BLU (p/w Blk) B
TILT R UP YEL (p/w Blk) C
TILT R DN GRN (p/w Blk) D
REM. AUTO WHT (p/w Blk) E
F
S6
MAIN DN WHT (p/w Red) A
MAIN UP ORG (p/w Blk) B
REM MAN BRN (p/w Red) C
BYPASS YEL (p/w Red) D
ROLL CCW GRN (p/w Red) E
ROLL CW BLU (p/w Red) F
DB15
1 BRN (p/w Blk) TILT L UP
2 BLU (p/w Blk) TILT L DN
3 YEL (p/w Blk) TILT R UP
4 GRN (p/w Blk) TILT R DN
5 ORG (p/w Blk) BOOM UP
6 WHT (p/w Red) BOOM DN
7 BRN (p/w Red) REM. MANUAL
8 YEL (p/w Red) BYPASS
9 GRN (p/w Red) SLANT L DN
10 BLU (p/w Red) SLANT L UP
11
12
13
14 WHT (p/w Blk) BYPASS+
15

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